



Small-Scale Cogeneration



What It Is:

Kitchens, Laundries, Showers...all these systems are driven primarily by heat but still require an electric generator for power. To eliminate the generator and improve efficiency and performance, the burners and generators are being integrated in a process called cogeneration. Investigations include how to:

- Use the waste heat from conventional generators to heat kitchen appliances;
- Use the waste heat from conventional burners to produce electricity.

Why It's Needed:

Cogeneration technology will help to overcome one of the challenges of field operations: the need to haul electric generators, which often weigh as much as the systems they're supporting.

How It Works:

These are major technology thrusts:

- **Thermoelectric Water Heater...**The thermoelectric generator — the size of a floppy disk — uses just one-half percent of the water heater's heat to power a burner and a water pump.
- **Engine-Driven Cogenerator...**This system captures 50% of the waste heat to heat water and kitchen appliances (the cogenerator is being demonstrated in a HMMWV-towable kitchen called the CHUCK wagon).
- **Liquid-Injected Cogeneration...**Waste heat is used to "superheat" a liquid, which is injected into a turbine or a linear expander to power the kitchen.
- **Fuel Cell Cogenerator...**This system produces heat for the kitchen and hydrogen for a fuel cell that provides electric power for operating the kitchen.
- **Thermophotovoltaics...**Light from a burner mantle is converted to electricity with photovoltaics, which provide heated water as they are cooled.

Benefits:

Reduced Waste...Cogenerators will improve fuel efficiency from 25% to 75%.

Low Maintenance...The integrated burners and generators use fewer components and are more reliable.

Less Noise...These small-scale systems operate more quietly than traditional generators, at only 60-70 dB compared to 80-90 dB. The lightweight integrated system weighs a fraction of the conventional independent generator sets.

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Rev 10-19-01